

Research Proposal

Factors and Thresholds for Irreducible Pollutant Levels

Problem Title. Are there factors, including factor levels, affecting which of certain pollutants in highway runoff can be considered negligible or irreducible (e.g. phosphorus from rural highways) and can be dispersed on roadsides, agricultural lands, forests, or disposed in dry wells?

Problem Statement. This project could provide a technical rationale for using sheet-flow dispersion or off-site mitigation in some instances as the preferred stormwater control methods in lieu of manual-prescribed treatment system designs.

Literature Search. Several studies have been conducted since the early 80s. Most have attempted to develop a statistical relationship between runoff quality and highway metrics over a broad range of highways, with varying levels of success. Few have looked exclusively at low volume/rural roads. California's Caltrans conducted a highway runoff study that found no statistical correlation between highway runoff quality and average daily traffic (ADT) levels for roads that carried less than 30,000 vehicles/day. There appears to be a statistical ADT/runoff quality relationship for those highways that exceed 30,000 vehicles/day, but several other factors also proved statistically significant and the relationship was highly nonlinear. Phosphorus shows no upward trend in concentration with increasing ADT, and may actually be less in most urbanized areas.

Research Methods. Continue literature searches and follow the progress of highway monitoring programs of other DOTs and transportation agencies, focusing on low ADT roads. Additional in-state monitoring may be warranted, emphasizing sampling the entire duration of wintertime runoff hydrographs. Long-duration wintertime storms are generally sampled quite frequently at the beginning of runoff hydrographs, emphasizing the "first flush" over the first 0.5 to 1.0 inch of rainfall. Generally the receding leg of runoff hydrographs are under- or un-sampled because sample bottles tend to fill during the early portions of the storms. Intuitively, this would seem to upwardly bias event mean concentration data from highway runoff because the roadway has been effectively "washed off" during the early portion of the storm.

Partnering Opportunities. Low

Estimate of Costs and Research Duration. Estimated costs not developed, but expected to be greater than \$100,000 for continued searches and meta-analysis; greater than \$250,000 for combined literature searches, meta-analysis, and additional monitoring, which would require evaluation of numerous variables, representative geographical and geological coverage, and adequate sample size.

Urgency, Payoff Potential, and Implementation. Long-term payoff potential is substantial, as research results could justify the use of lower cost stormwater management facilities.

Research Proposer.

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Research Monitor (to be assigned, as needed, by the research program administrator)

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